MILITARY SPECIFICATION

PAINT, WATER DISPLACING

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the manufacture and acceptance of two types of a water displacing paint which may be applied from gas pressurized containers or by brush. The paint covered by this specification is intended for use on any metal surface.

1.2 Classification. The paint consists of the following types, as specified (see 6.2.1):

Type	Description
I	Aerosol spray container
II	Bulk form

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications ,standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Engineering Center, Systems Engineering and Standardization Department (SESD) (Code 93), Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 8010

SPECIFICATIONS

FEDERAL

QQ-A-250/4	-	Aluminum Alloy 2024, Plate and Sheet.
TT-T-291	-	Thinner, Paint, Mineral Spirits, Regular and Odorless.
PPP-P-1892	-	Paint, Varnish, Lacquer and Related Materials, Packaging, Packing, and Marking of.

MILITARY

MIL-C-5541	-	Chemical Conversion Coatings on Aluminum and Aluminum Alloys.
MIL-H-5606	-	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance.
MIL-S-7952	-	Steel, Sheet and Strip, Uncoated, Carbon (1020 and 1025)(Aircraft Quality).
MIL-C-81706	-	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys.
MIL-H-83282		Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft.

STANDARDS

FEDERAL

FED-STD-313	-	Material Safety Data Sheets, Preparation and Submission of.
FED-STD-141	-	Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling and Testing.
FED-STD-595	-	Color.

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D93	-	Test Method for Flash Point by Pensky - Martens Closed Tester
ASTM B 117	-	Salt Spray (Fog) Testing.
ASTM D 523	-	Specular Gloss.
ASTM D 1210	-	Fitness of Dispersion of Pigment - Vehicle Systems.
ASTM D 1296	-	Odor of Volatile Solvents and Diluents.
ASTM D 1640	-	Drying, Curing, or Film Formation of Organic Coating at Room Temperature.
ASTM D 2197	-	Adhesion of Organic Coatings.
ASTM D 3335	-	Low Concentrations of Lead, Cadmium and Cobalt in Paint by Atomic Absorption Spectroscopy.
ANSI/ASTM D 3359	-	Adhesion by Tape Test, Measuring.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Non government standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The paints furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.2 Material.

3.2.1 Type I. Materials used in the manufacture of products supplied under this specification shall be such a quality as to produce products conforming to the requirements of this specification. The contents of each 16 ounce container of Type I shall consist of 85 percent by volume of the water displacing paint and 15 percent by volume of propane propellent.

3.2.2 Type II. The contents of the Type II material shall consist of the water displacing paint.

3.2.3 Colors. All colors, other than gloss white, shall contain a sufficient amount of corrosion inhibiting pigment such that the water displacing paint will meet the requirements of 3.6.7.

3.3 Toxicity. The paints shall have no adverse effect on the health of personnel when used for their intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency. Material safety data sheets shall be prepared in accordance with FED-STD-313. One copy shall be made available to the qualifying activity along with the qualification sample (see 4.3.1).

3.3.1 Lead. The paints shall be lead-free (see Table I).

3.3.2 Formulation. The formulation for the gloss white water-displacing paint shall be as specified in Table I. Other colors shall consist of the same binder and resin system with pigments to match the desired color.

3.4 Composition.

3.4.1 Solvent content. The solvent content of the compound shall consist of a non-photochemically reactive solvent blend. A non-photochemically

reactive solvent is any solvent with an aggregate of less than 20 percent of its total volume composed of the chemical compounds classified below or which is not greater than any of the following individual percentage composition limitations, referred to the total volume of solvent:

a. A combination of hydrocarbons, alcohols, aldehydes, esters, or ketones having an olefinic or cyclo-olefinic type of unsaturation: 5 percent;

b. A combination of aromatic compounds with eight or more carbon atoms to the molecule, except ethylbenzene: 8 percent;

c. A combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene or toluene: 20 percent.

3.5 Physical properties - liquid.

3.5.1 Condition in container. The Type II paint, having been allowed to stand without agitation for at least two weeks in a closed container, shall be capable of being easily mixed by shaking the container for 60 seconds or by hand shaking followed by mixing by hand with a paddle to a homogeneous condition. Type I paint shall be easily mixed by shaking vigorously by hand for 60 seconds.

3.5.2 Odor. The odor of the paint as packaged or after application shall be characteristic of the solvents and resin used and shall not be obnoxious.

3.5.3 Fineness of grind. The fineness of grind of the paint after sufficient agitation shall be not less than 6 for a gloss finish, and not less than 4 for a lusterless finish.

3.5.4 Synthetic sea water displacement. The paint, when tested as specified in 4.6.1, shall allow no visible signs of corrosion to form on the specimens.

3.5.5 Storage stability. The previously unopened packaged product shall meet all the requirements specified herein for a period of one year, provided that the daily mean temperature of the ambient air at the storage location falls within the range of 35°F to 95°F, and the peak ambient air temperature is not greater than 115°F. The material shall be mechanically agitated for 15 minutes before being opened.

3.6 Film properties.

3.6.1 Drying time. The paint, when tested as specified in 4.6.1, shall set to touch in 20 minutes or less.

3.6.2 Surface appearance. The water displacing paint shall spray satisfactorily and shall show no sagging, running or streaking. The dried film shall be free from grit, seeds, craters, blisters or any other surface irregularities (see 4.6).

3.6.3 Adhesion - tape test. The applied paint, when tested as specified in 4.6, shall exhibit a ranking of 4A as stated in the test method (see Table III).

3.6.4 Adhesion - scrape test. The applied paint, when tested as specified in 4.6, shall exhibit a scrape adhesion value of not less than 3.0 kilograms (see Table III).

3.6.5 Gloss. The specular gloss of the applied paint, when measured as specified in 4.6, shall be not less than 90 for gloss colors and not greater than 3.0 for lusterless colors (see Table III).

3.6.6 Hydraulic fluid resistance. The paint film, when tested as specified in 4.6.2, shall withstand immersion in the hydraulic fluid without softening, blistering, visibly separating from the panel or exhibiting any other coating deficiency. Discoloration of the coating is acceptable and shall not be cause for rejection.

3.6.7 Corrosion resistance - salt spray. When the paint is tested as specified in 4.6, it shall exhibit no blistering, lifting of the coating system, or substrate corrosion after exposure to 5 percent salt spray for 1000 hours. Slight corrosion in the scribe is acceptable (see Table III).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.3).

b. Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall consist of the examinations and tests specified in Table II.

4.3.1 Qualification samples. The qualification inspection samples shall consist of one gallon of gloss white (FED-STD-595 color number 17925), one quart of color number 35237, and two aerosol cans of each color. The material shall be furnished in containers of the type to be used in filling contract orders. Samples shall be forwarded to the test facility specified in the letter of authorization to submit samples (see 6.3). The samples shall be plainly identified by securely attached durable tags marked with the following information:

a. Qualification inspection samples
b. PAINT, WATER DISPLACING
c. Type I or Type II, as applicable
d. Color number
e. Manufacturer's name and product number
f. Submitted by (name and date) for qualification inspection in accordance with the requirements of MIL-P-85658 under authorization (reference authorizing letter) (see 6.3).

4.3.2 Test report. In addition to the qualification test samples, the manufacturer shall include a test report showing that the material conforms to the requirements of this specification. Material safety data sheets shall be prepared in accordance with FED-STD-313 and made available to the qualifying laboratory at this time.

4.3.3 Retention of qualification. In order to retain qualification of products approved for listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity that his product(s) comply with the requirements of this specification. Unless otherwise specified by the qualifying activity, the time of periodic verification by certification shall be in two-year intervals from the date of original qualification.

4.4 Quality conformance inspection.

4.4.1 Batch. A batch (bulk lot) is an indefinite quantity of a homogeneous mixture of product manufactured in a single operation. A batch shall be considered a lot for inspection purposes.

4.4.2 Physical property tests. Samples for quality conformance testing shall be randomly selected from each lot. Sufficient material shall be selected to perform all the tests specified in Table II, except for storage stability , hydraulic fluid resistance, and corrosion resistance. For Type II material, an additional one quart sample shall be selected and forwarded to the qualifying laboratory (see 6.3) for use as a reference sample. Failure to meet any quality conformance requirement in Table II shall be cause to reject the lot represented by the sample.

4.4.3 Packaging inspection. A packaging inspection shall be made to determine compliance with section 5 of this specification. Inspection shall be in accordance with PPP-P-1892.

4.4.4 Noncompliance. If a sample fails to pass any quality conformance test, the lot represented by the sample shall be rejected. This may also be cause to remove the product from the Qualified Products List. Rejected material shall not be resubmitted for quality conformance without approval of

the qualifying laboratory (see 6.3). Requests for approval shall contain full particulars concerning the previous rejections and steps taken to correct the the deficiencies. When the lot is retested, sampling and testing shall be as specified in 4.4.2.

4.5 Test panels. Test panels shall be prepared under laboratory test conditions (see 4.6) with the exception of the synthetic sea water test (see 4.6.1), all panels used for test purposes shall be aluminum alloy conforming to QQ-A-250/4 (T3 temper), 0.020 by 3 by 6 inches in size, and shall be treated with materials meeting MIL-C-81706 to produce coatings conforming to MIL-C-5541.

4.5.1 Application of paint. The water displacing paint shall be prepared by thoroughly mixing the material. Spray the test panels with 2 cross coats, wait 10 minutes and spray another 2 cross coats. The dry film thickness shall be 1.6 ± 0.4 mils. Allow at least seven days curing at 77° ± 5°F and relative humidity at 50 ± 10% before testing.

4.5.2 Specimens for synthetic sea water test. The material for the test panels shall be carbon steel conforming to FS1020 of MIL-S-7952. Test panels requiring compound coatings shall be 2 by 4 by 1/8 inches.

4.5.3 Preparation of test panels. Panels shall have all sharp edges and burrs removed and shall have all holes chamfered to prevent injury in handling. The panels shall be surface ground and hand polished with a 240 grit silicon carbide or aluminum oxide cloth or paper to produce a surface finish of 10 to 20 microinches (rms). Iron oxide or so-called "wet or dry" papers or cloths shall not be used.

4.5.3.1 Cleaning of test panels. The utensils and cloths used in the cleaning of test panels shall be clean and free of contamination. Solvents shall be fresh and renewed frequently. In all stages of treatment, the handling of panels with the bare hands shall be avoided. The panels shall not be permitted to contact contaminated surfaces during the cleaning procedure and shall be handled by tongs and hooks during and after dipping. After polishing, they shall be cleaned with a surgical gauze swab, in a beaker of hot mineral spirits conforming to Grade I of TT-T-291. Cleaning and scrubbing shall be followed by dipping in (1) a second container of hot mineral spirits, (2) boiling 95 percent methanol, and (3) boiling absolute methanol. The panels shall be allowed to dry and shall then be stored in a desiccator until used. If storage of more than 24 hours occurs, the surface preparation shall be repeated starting with the hand polishing.

4.6 Test methods. The tests of this specification shall be conducted in accordance with Table III, 4.6.1 and 4.6.2, with the test panels prepared as specified in 4.5. Ingredient materials submitted shall be tested to determine compliance with the applicable specification. Test conditions shall be as specified in the applicable test method or paragraph.

4.6.1 Synthetic sea water displacement.

4.6.1.1 Test solution. The synthetic sea water shall be prepared by adding 50 grams of sodium chloride (NaCl); 22 grams of magnesium chloride

($MgCl_2 \cdot 6H_2O$); 3.2 grams of calcium chloride ($CaCl_2 \quad 2H_2O$); and 8.0 grams of sodium sulfate (Na_2SO_4) to a liter of distilled or demineralized water.

4.6.1.2 Procedure. Panels prepared as specified in 4.5.3 shall be placed so that one 2-inch end shall be raised one inch above a horizontal surface. The panels shall then be sprayed with the synthetic sea water of 4.6.1.1 so that the entire upper surface of the specimen is covered with tiny droplets. Within one minute after spraying, one milliliter (ml) of the test compound shall be poured along the upper two-inch edge of the panels and allowed to run slowly down the specimen so as to completely cover the test panel. After another minute, a second ml of the test compound shall be allowed to run down the panels in a like manner. After waiting an additional minute, the panels shall be picked up and held in a vertical position for one minute and shall then be placed flat (test side up) above distilled water at 72°F in a closed desiccator. After 4 hours, they shall be removed and cleaned with mineral spirits, and then evaluated for presence of visible corrosion.

4.6.2 Hydraulic fluid resistance. Test panels, prepared as specified in 4.5, shall be separately immersed for 24 hours in MIL-H-5606 hydraulic fluid at 66 ± 3°C (150 ± 5°F) and MIL-H-83282 hydraulic fluid at 66 ± 3°C (150 ± 5°F). Four hours after removal, the various films shall be examined for conformance to 3.6.6.

5. PACKAGING

5.1 Packaging and packing. The paint shall be packaged, packed and marked in accordance with PPP-P-1892. The level of preservation shall be A or C and the level of packing shall be A, B, or C, as specified (see 6.2.1). The size of the containers shall also be as specified (see 6.2.1).

5.2 Marking and labeling. In addition to the marking specified in PPP-P-1892, individual cans and containers shall bear a printed label (all printed labels shall be coated with a clear coating for weather proofing) showing the following nomenclature and information, as applicable:

MIL-P-85658, Type I or Type II
Name of manufacturer and product designation
Date of manufacture by month and year
Batch number/net contents
Mixing and thinning instructions (Type II only)
Precautions

a. The surface to be painted shall be absolutely clean and free of oil, dust, etc.

b. Equipment shall be adequately grounded. Spray Equipment shall be cleaned immediately after use.

c. The paint from one vendor, or component thereof, shall never be mixed with that of another vendor.

6. NOTES

6.1 Intended use. The paint covered by this specification is intended for use on any metal surfaces. It is primarily intended for in-service

treatment. It should not be used around liquid oxygen fittings. The ability of this material to prevent corrosion, to displace water, and its ease of application from pressurized spray cans make it particularly suited for service use. This paint is intended for use in non-moving parts not requiring a lubricated surface, such as fasteners, seams, access panels, joints, unpainted metal, and where paint is cracked or damaged.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Color.

c. Classification (Type I or II) (see 1.2).

d. Quantity required for quality conformance testing (see 4.4.1).

e. Quantity (specify number of cans) and size of aerosol container (see 5.1).

f. Level of preservation required (see 5.1).

g. Level of packing required (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List (QPL-85658) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Commander, Naval Air Systems Command (AIR-5304), Washington, DC 20361; however, information pertaining to qualification of products and letter of authorization for submittal of sample may be obtained from the Commander, Naval Air Development Center, Attn: Code 6062, Warminster, PA 18974.

6.4 Key word listing. The following key words are listed to identify this document during retrieval searches:

Paint
Water - Displacing

Custodians:
Army - ME
Navy - AS
Air Force - 20

Review activities:
Army - AR, MI, MR
Air Force - 84
DLA - GS

Preparing activity:
Navy - AS

(Project 8010-1065)

User activities:
Army - AV, ER
Navy - OS, SH

TABLE I. Paint Formulation (gloss white).

Component	Reference	Percent by weight
Silicone alkyd resin 1/	Figure 1	39.0
Titanium dioxide		11.0
Zinc molybdate 2/		6.4
Ethyl acetate		22.0
Propylene glycol monoethyl ether acetate		1.3
Aromatic mineral spirits 3/	Figure 2	4.4
1,1,1 trichlorotrifluoroethane		7.4
VMP naphtha		3.1
Isopropyl, tri (N-ethylamine-ethylamino) titanate 4/ (4.5 percent in isopropyl alcohol)	Figure 3	2.2
Sodium petroleum sulfonate 5/	Figure 4	2.2
Amorphous silica 6/		1.0

1/ 385-50E - McCloskey Varnish or equal.

2/ Moly White 101 - Sherwin Williams or equal.

3/ Solvent G - Union Oil of California or equal.

4/ KR-44S-Kenrich Chemical Co. or equal.

5/ Alox 904 - Alox Co. or equal.

6/ Aerosil K 972 - Degussa or equal.

TABLE II. Qualification inspection.

Test	Requirement paragraph	Test method paragraph
Lead content	3.3.1	4.6
Solvent content	3.4.1	4.6
Condition in container	3.5.1	4.6
Odor	3.5.2	4.6
Fineness of grind	3.5.3	4.6
Synthetic sea water displacement	3.5.4	4.6.1
Storage stability	3.5.5	4.6
Drying time	3.6.1	4.6
Surface appearance	3.6.2	4.6
Adhesion (tape test)	3.6.3	4.6
Adhesion (scrape test)	3.6.4	4.6
Gloss	3.6.5	4.6
Hydraulic fluid resistance	3.6.6	4.6.2
Corrosion resistance (salt spray)	3.6.7	4.6

TABLE III. Test methods.

Requirement paragraph	Test	FED-STD-141 method	ASTM method
3.3.1	Lead content		D 3335
3.4.1	Solvent content	7360	
3.5.1	Condition in container	3011.1	
3.5.2	Odor		D 1296
3.5.3	Fineness of grind		D 1210
3.5.5	Storage stability	3022	
3.6.1	Drying time		D 1640
3.6.2	Surface appearance		D 93
3.6.3	Adhesion (tape test)		D 3359
3.6.4	Adhesion (scrape test)		D 2197
3.6.5	Gloss		D 523
3.6.7	Corrosion resistance (salt spray)		B 117

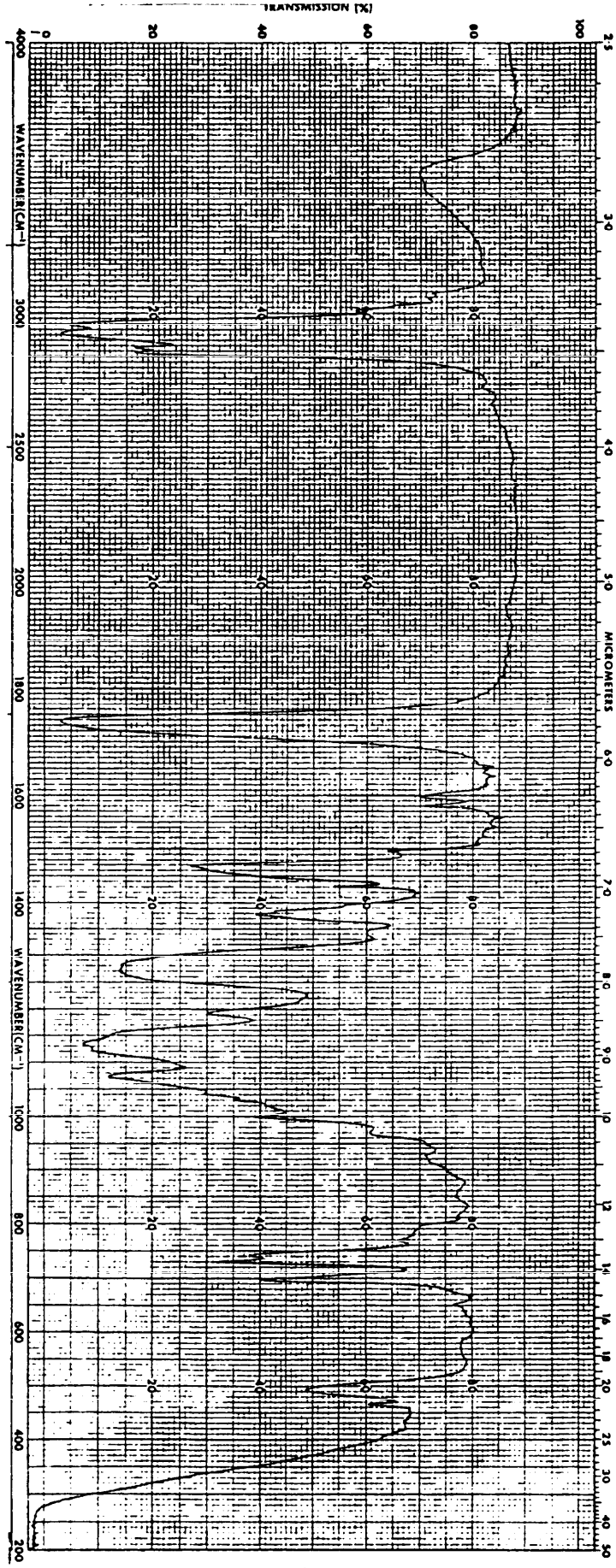

Figure 1. Infrared spectrum of Silicone Alkyd Resin.

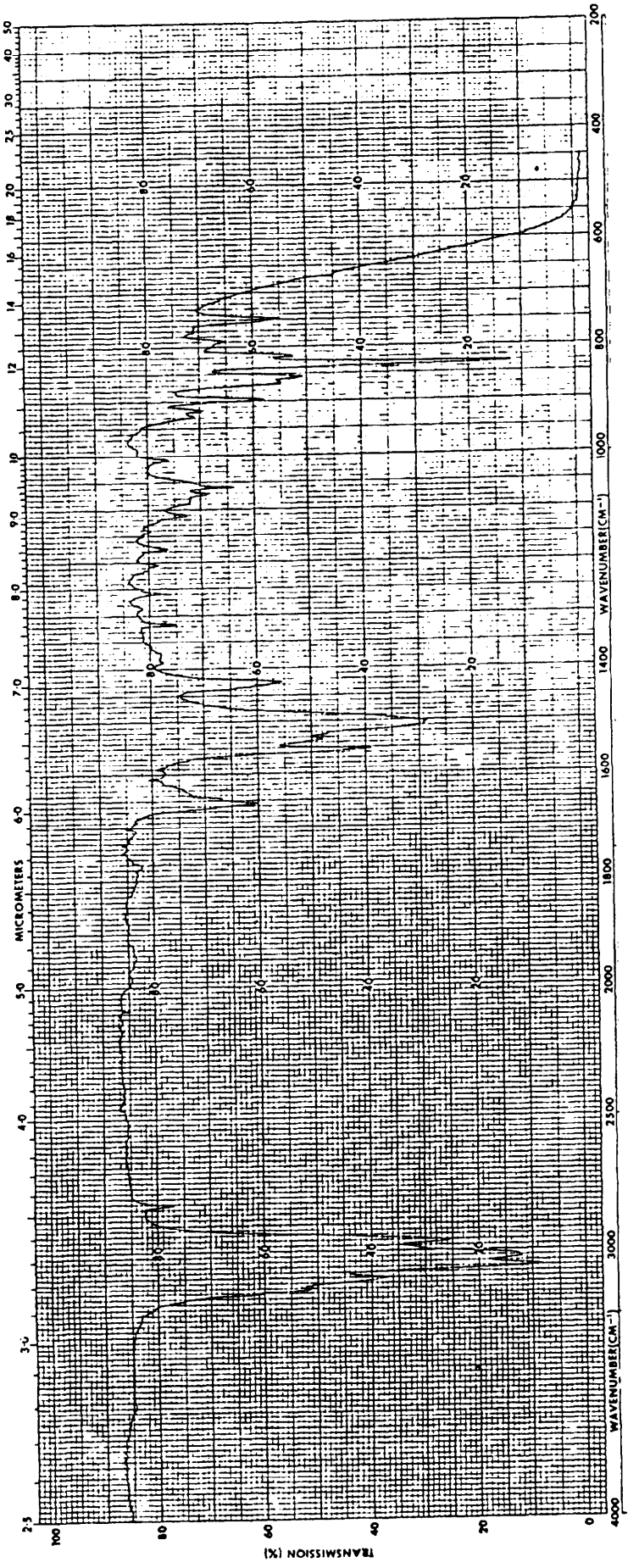

Figure 2. Infrared spectrum of Aromatic Hydrocarbon.

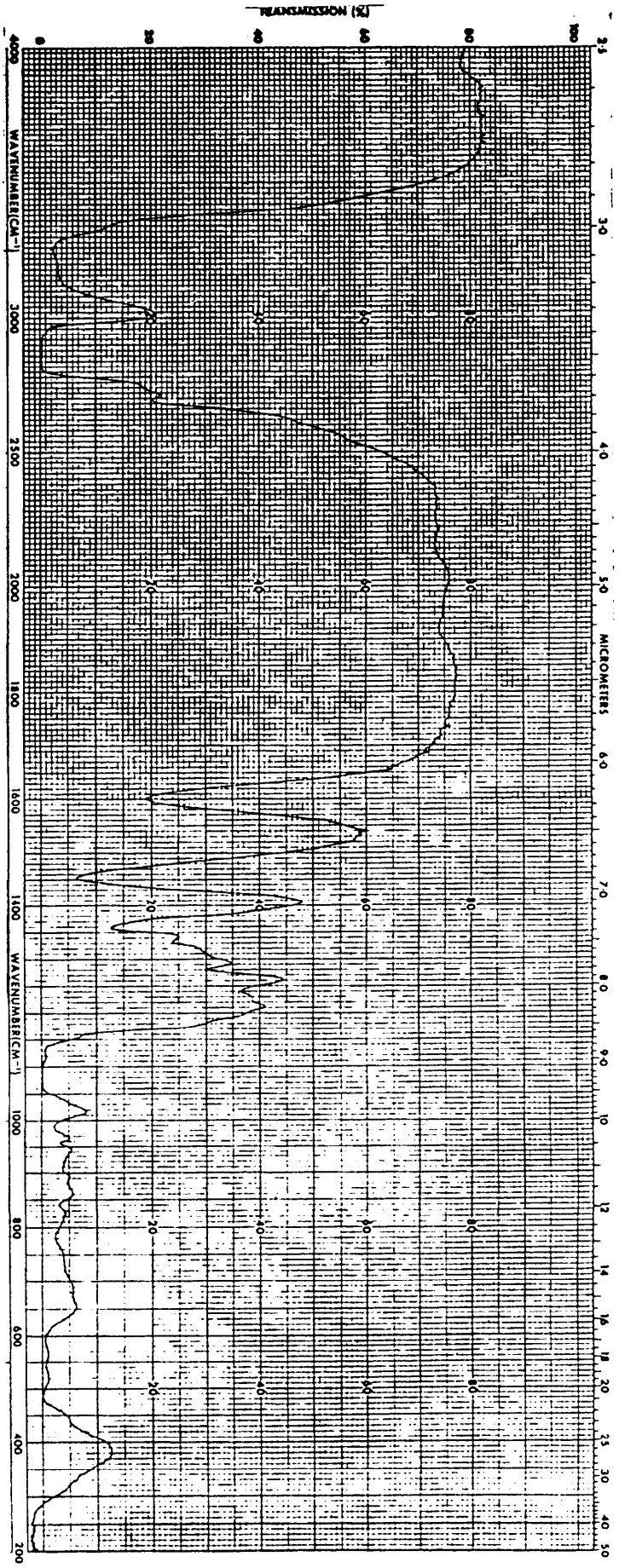

Figure 3. Infrared spectrum of isopropyl, tri (N-ethylamine-ethylamino) titanate (4,5 percent in isopropyl alcohol

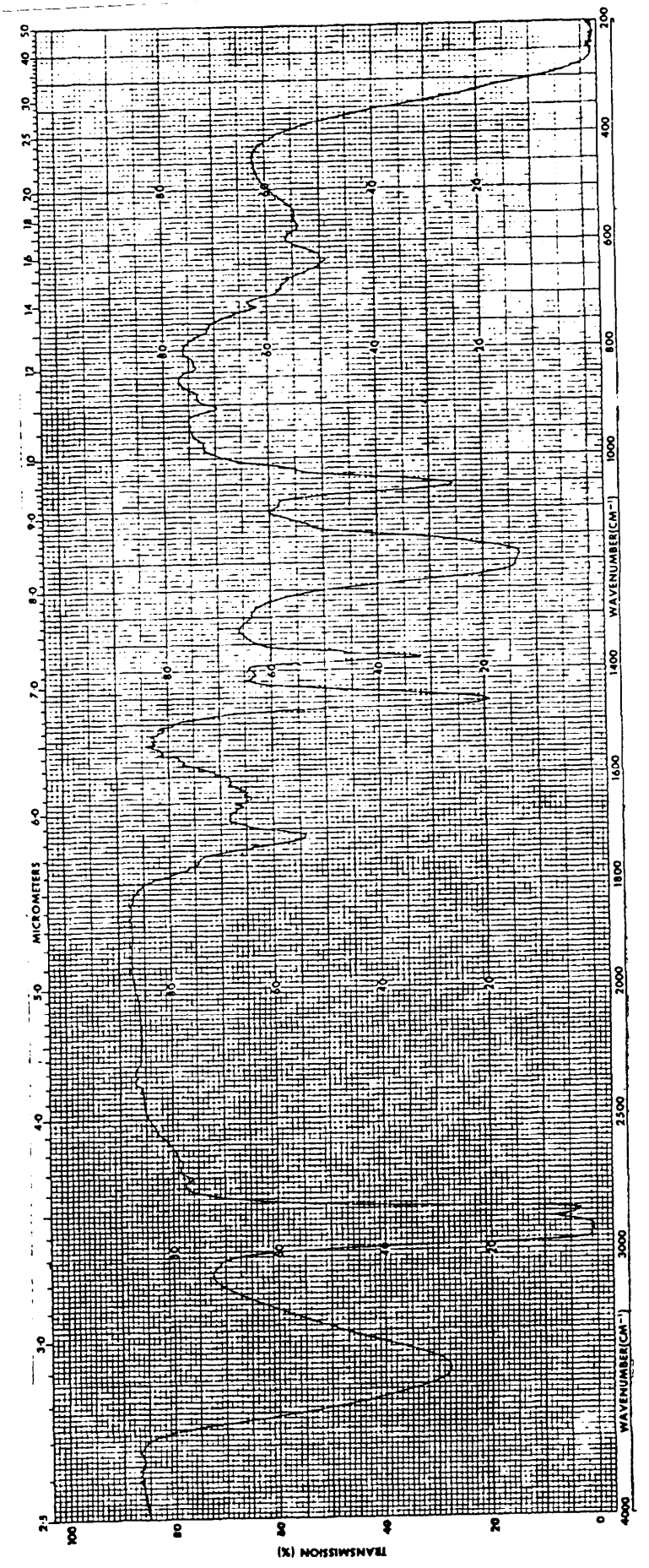

Figure 4. Infrared spectrum of sodium petroleum sulfonate.

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NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document*(s)* or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-P-85658	PAINT, WATER DISPLACING

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*:

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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